US007279517B2

(12) **United States Patent**
Mueller et al.

(10) **Patent No.: US 7,279,517 B2**
(45) **Date of Patent: Oct. 9, 2007**

(54) **PROCESS FOR THE ALKOXYLATION OF ORGANIC COMPOUNDS IN THE PRESENCE OF NOVEL FRAMEWORK MATERIALS**

(75) Inventors: **Ulrich Mueller**, Neustadt (DE); **Michael Stoesser**, Neuhofen (DE); **Raimund Ruppel**, Dresden (DE); **Eva Baum**, Schwarzheide (DE); **Edward Bohres**, Mannheim (DE); **Marcus Sigl**, Mannheim (DE); **Lisa Lobree**, Philadelphia, PA (US); **Omar M. Yaghi**, Ann Arbor, MI (US); **Mohamed Eddaoudi**, Ann Arbor, MI (US)

(73) Assignees: **BASF Aktiengesellschaft**, Ludwigshafen (DE); **University of Michigan**, Ann Arbor, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 495 days.

(21) Appl. No.: **10/492,192**

(22) PCT Filed: **Oct. 18, 2002**

(86) PCT No.: **PCT/EP02/11700**

§ 371 (c)(1),
(2), (4) Date: **Apr. 19, 2004**

(87) PCT Pub. No.: **WO03/035717**

PCT Pub. Date: **May 1, 2003**

(65) **Prior Publication Data**

US 2004/0249189 A1 Dec. 9, 2004

Related U.S. Application Data

(63) Continuation of application No. 10/039,733, filed on Oct. 19, 2001, now abandoned.

(51) **Int. Cl.**
C08L 75/00 (2006.01)
C07C 67/26 (2006.01)

(52) **U.S. Cl.** **524/199**; 560/209

(58) **Field of Classification Search** ..... None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,144,418 A 8/1964 Hill et al.

FOREIGN PATENT DOCUMENTS

DE	44 08 772	9/1994
DE	101 43 195	3/2003
WO	00/78837	12/2000
WO	01/16209	3/2001
WO	01/27186	4/2001

OTHER PUBLICATIONS

S. Hayase, et al., "Polymerization of cyclohexene oxide with al(acac)$_3$-silanol catalyst supported by zeolite and porous silica", Journal of Polymer Science: Polymer Chemistry Edition, vol. 19, No. 10, pp. 2541-2550 1981.

Masakatsu Kuroki, et al., "(5,10, 15,20-Tetraphenyl-porphyrinato)manganese acetate as a novel initiator for the ring-opening polymerization of 1,2-epoxypropane", Makromolekulare Chemie, vol. 189, No. 6, pp. 1305-1313 Jun. 1, 1988.

H. Li, et al., "Design and synthesis of an exceptionally stable and highly porous metal-organic framework", NATURE, vol. 402, pp. 276-279 1999.

Primary Examiner—Paul A. Zucker
(74) *Attorney, Agent, or Firm*—Oblon, Spivak, McClelland, Maier & Neustadt, P.C.

(57) **ABSTRACT**

The present invention relates to a process for the alkoxylation of organic compounds comprising the reaction of at least one organic compound with at least one alkoxylating agent in the presence of a catalyst system, wherein a polyether alcohol is obtained. The catalyst system comprises a metallo organic framework mate-rial comprising pores and at least one metal ion and at least one at least bidentate organic compound, which is coordinately bounded to said metal ion. Furthermore it relates to polyurethanes or polyurethane foams, which are obtainable by using a prepared polyether alcohol as a starting material.

15 Claims, 2 Drawing Sheets